DOE F 1325.8
(8-89)
EFG (07-90)

United States Government **Department of Energy**

Memorandum

DATE: DEC 1 0 2008

REPLY TO ATTN OF: EM-63 (Dr. James M. Shuler, 301-903-5513)

SUBJECT: Six Month Extension of Authorization for Shipment of Neptunium Oxide in the 9975

TO: Patrick W. McGuire, Savannah River Operations Office

On January 24, 2007, I authorized the use of the 9975 package for a one time shipment of up to 60 packages with neptunium oxide to Idaho National Laboratory (INL), with no return shipments. A copy of this authorization and the Safety Evaluation Report for the letter amendment is attached. The approval stated that the neptunium oxide will be shipped under 9975 Content Envelop C.8 (Neptunium Oxide) requirements and that all conditions of CoC USA/9975/B(M)F-85(DOE) apply. This authorization was to expire on January 31, 2008, but based on your request, the expiration date was extended to December 31, 2008. Your memorandum of November 26, 2008, requested an extension of the Neptunium Oxide shipment date until June 30, 2009 and to allow shipments to Oak Ridge National Laboratory (ORNL) in addition to INL. Your request to add shipments from Savannah River National Laboratory (SRNL) to ORNL and to extend the authorization for shipments of Neptunium Oxide until June 30, 2009 is approved.

If you have any questions, please call Dr. James M. Shuler at (301) 903-5513.

Sincerely,

Dae Y. Chung
Headquarters Certifying Official
Deputy Assistant Secretary
Office of Safety Management and Operations
Office of Environmental Management

Attachment

cc w/att.:
James Shuler, EM-63
Stephen O'Connor, EM-63
R. LaGrange, EM-14
Steven Bellamy, WSRC

DOE F 1325.8
(8-89)
EFG (07-90)

United States Government **Department of Energy**

Memorandum

DATE: JAN 2 4 2007

REPLY TO ATTN OF: EM-60 (Dr. James Shuler, 301-903-5513)

SUBJECT: Authorization for Shipment of Neptunium Oxide in the 9975

TO: Jeffery M. Allison, Manager Savannah River Field Office

Your request of January 11, 2007 to use the 9975 package for a one time shipment of to 60 packages with neptunium oxide to Idaho National Laboratory (INL), with no return shipment planned or requested, is approved. The neptunium oxide will be shipped under 9975 Content Envelop C.8 (Neptunium Oxide) requirements. All conditions of CoC USA/9975/B(M)F-85 (DOE) apply. The Safety Evaluation Report (SER) for this amendment is attached. This authorization expires on January 31, 2008.

If you have any questions, please contact Dr. James Shuler at 301-903-5513.

Dae Y. Chung
Headquarters Certifying Official
Safety Management and Operations
Office of Environmental Management

cc:
James Shuler, EM-60

Safety Evaluation Report
for the
Justification for Shipment of Neptunium Oxide in the 9975 Packaging

S-TRT-A-00003, Revision 0
December 2006

Docket Number 07-14-9975

January 24, 2007

Prepared by: _____ Date: 1/24/07

James M. Shuler
Manager, Packaging Certification Program
Safety Management and Operations
Office of Environmental Management

Approved by: _____ Date: 1/24/07

Dae Y. Chung
Headquarters Certifying Official
Safety Management and Operations
Office of Environmental Management

PREFACE

This report documents the review of the SRNL Submittals[1,2] for the shipment of neptunium oxide under expanded 9975 Content Envelop C.8. The neptunium oxide is currently stored at the Savannah River Site awaiting shipment to Idaho National Laboratory.

Normally, modified contents are included into the next revision of the SARP. However, the contents, identified to be shipped from Savannah River Site to Idaho National Laboratory, are a one time shipment of up to 60 packages, and can be authorized with a letter amendment to the Certificate of Compliance.

Safety Evaluation Review Report for the Justification for Shipment of Neptunium Oxide in the 9975 Packaging

January 24, 2007

Chapter 1: General Information

This Safety Evaluation Report (SER) covers the staff's findings, regarding the review of the Savannah River National Laboratory (SRNL) Submittal, *Justification for Shipment of Neptunium Oxide in the 9975 Packaging.*[1] This section of the SER covers the review of the General Information provided in Chapter 1 of the SRNL Submittal. Specifically, the review encompassed modified neptunium oxide contents, under the expanded 9975 Packaging Content Envelop C.8, as per Table 1 of the SRNL submittal.

The results of the transport safety assessment for the proposed change are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope

While the total plutonium of the production neptunium oxide material is within the limits specified for Content C.8, the plutonium isotopic distribution is not. In particular, the ^{239}Pu concentrations exceed that specified in Table 1 of the SRNL submittal. Also, the non-radioactive impurities in the production material exceed the limits specified.

The modified neptunium oxide content, as per Table 1 of the SRNL Submittal, has been analyzed in a manner similar to that used for previously analyzed content configurations. Due to the similarity with other previously authorized content configurations, no unusual effects on the primary containment vessel (PCV), the secondary containment vessel (SCV), or other packaging components, were expected or found.

Findings

Based on the review of the statements and representations in the SRNL Submittal, the staff has concluded that the package design has been adequately described to meet the requirements of 10 CFR 71.

Conditions of Approval

The SRNL Submittal is for a one-way shipment and only needs a letter amendment to the Model 9975 B (M) F-85 Packaging.[3] The existing Certificate of Compliance (CoC)[4] does not have to be revised, but can be amended to authorize this one-way shipment.

Chapter 2: Structural Evaluation

This section of the SER covers the staff's assessment of the Structural Evaluation information provided in Chapter 2 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the structural review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
The modified neptunium oxide configuration has been analyzed in a manner that was similar to that used for previously analyzed configurations. Savannah River Site procedures ensure that the gross weight of neptunium oxide contents, loaded in the primary containment vessel, is less than 7,910 grams (17.4 pounds), which is less than the maximum permitted mass of 44.4 pounds. Due to similarities in geometry and mass with other previously authorized content configurations, no unusual effects on the structural integrity of the PCV, the SCV, or other packaging components, were expected or found.

Findings
Based on the review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the structural design of the modified content configurations has been adequately described. The staff has also concluded that the possible effects of the modified content configurations on the structural integrity of the 9975 packaging have been properly evaluated in accordance with the requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 3: Thermal Evaluation

This section of the SER covers the staff's review of the Thermal Evaluation information provided in Chapter 3 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the thermal review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
The similarity of modified neptunium oxide configuration to previously authorized content configurations results in no unusual thermal behavior from the previously considered content configurations. The decay heat rate for the modified neptunium oxide content is estimated to be 2.26 watts.[5]

Findings
Based on the review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the package design has been adequately described to meet the requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 4: Containment

This section of the SER covers the staff's review of the Containment information provided in Chapter 4 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the containment review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
There are no containment-related issues associated with the modified neptunium oxide contents. The modified neptunium oxide content does not increase the impact loading on the containment vessels, does not increase the maximum temperature that must be sustained, and it does not increase the pressure that must be contained.[1]

Findings
Based on the review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the package design has been adequately described to meet the requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 5: Shielding Evaluation

This section of the SER covers the staff's review of the Shielding Evaluation information provided in Chapter 5 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the shielding review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
The modified neptunium oxide configuration, as per Table 1 of the SRNL Submittal, has been analyzed in a manner that was similar to that used for previously analyzed configurations. Due to the similarity with other, previously authorized content configurations, no adverse effects on the shielding design of the packaging were expected or found.[6] While an extremely conservative calculation did exceed the surface dose rate limit per 10 CRF 71, dose rate measurements taken on 33 packages to demonstrate compliance with 10 CFR 71, and as required by the 9975 SARP, gave contact gamma dose rates that ranged from 1–4 mrem/hr.[7] Neutron dose rates were below detection levels.[7] The remaining 27 packages will be monitored in the same manner.

Findings
Based on the review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the shielding design has been adequately described and evaluated and that the package meets the external radiation requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 6: Criticality Evaluation

This section of the SER covers the staff's review of the Criticality Evaluation information provided in Chapter 6 of the SRNL submittal.

Details of the items reviewed are listed above in the introduction to Chapter 1. The results of the criticality review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
The modified neptunium oxide configuration, as per Table 1 of the SRNL Submittal, has been analyzed in a manner that was similar to that used for previously analyzed configurations. Due to the similarity with other previously authorized content configurations, no adverse effects on the nuclear criticality safety design of the packaging were expected or found. The modified neptunium oxide content does not change the Criticality Safety Index of 2.0 for the 9975 Package.[8]

Findings
Based on alternate calculations by the staff, and a review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the nuclear criticality safety design has been adequately described and evaluated and that the package meets the nuclear criticality safety requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 7: Operating Procedures

This section of the SER covers the staff's review of the Operating Procedures information provided in Chapter 7 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the operating procedures review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
The SARP for the 9975 Package provides the basic required procedural steps for operating the package.[3] The procedural steps found in Chapter 7 of the SARP will be followed, therefore,

with the exception of Section 7.2.1, Step 3, Section 7.2.2, Step 6, and Section 7.2.3, Step 5, where the food-pack cans, PCV, and SCV shall be inerted with argon such that the oxygen content at the time of closure is no greater than 3%.[11,9]

Findings
Based on the review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the package design has been adequately described to meet the requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 8: Acceptance Tests and Maintenance

This section of the SER covers the staff's review of the Acceptance Tests and Maintenance information provided in Chapter 8 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the acceptance tests and maintenance review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
Because this request is associated with a change of contents only, there are no Acceptance Test-, or Maintenance-related issues associated with the modified neptunium oxide contents.

Findings
Based on the review of the statements and representations in the SRNL Submittal and the application, the staff has concluded that the package design has been adequately described to meet the requirements of 10 CFR 71.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

Chapter 9: Quality Assurance

This section of the SER covers the staff's review of the Quality Assurance information provided in Chapter 9 of the SRNL submittal.

Details of the items reviewed are noted above in the introduction to Chapter 1. The results of the quality assurance review are discussed below.

Neptunium Oxide Under Expanded C.8 Content Envelope
Because this request is associated with a change of contents only, there are no Quality Assurance-related issues associated with the modified neptunium oxide contents.

Findings
Based on review of the statements and representations in the SRNL Submittal and the application, the staff concludes the quality assurance plan has been adequately described and meets the quality assurance requirements of 10 CFR 71, Subpart H. Package-specific requirements are adequate to assure the package is designed, fabricated, assembled, tested, used, maintained, amended, and repaired in a manner consistent with its evaluation.

Conditions of Approval
The staff has concluded that no additional conditions of approval need to be added to the existing CoC[4] for the approval of this request.

References

[1] *Justification for Shipment of Neptunium Oxide in the 9975 Packaging*, S-TRT-A-00003, December 2006.

[2] *Letter Amendment Request for Neptunium Oxide Shipments in the 9975 Radioactive Material Shipping Container*, Jeffery Allison to Dae Chung, January 11, 2007.

[3] Westinghouse Savannah River Company, *Model 9975 B(M)F-85 Safety Analysis Report for Packaging*, WSRC-SA-2002-00008, Revision 0, December 2003, and the associated Addendum 1, SARA-G-00001, Rev. 0, April 2005.

[4] U.S. Department of Energy Certificate of Compliance, USA/9975/B (M) F-85 (DOE), Revision 17, September 8, 2006.

[5] *Maximum Heat Generation of an HB-Line Produced Neptunium Oxide Container*, X-CLC-H-00601, Revision 0, July 2006.

[6] *Neptunium Oxide Content Shielding Evaluation*, N-CLC-G-00111, Washington Safety Management Solutions, Aiken, South Carolina, December 2006.

[7] Personal Communication by e-mail, Steve Bellamy, SRNL, December 27, 2006.

[8] *Nuclear Criticality Safety Assessment. Shipment and Storage of NpO_2 in 9975 (U)*, WSRC-TR-2006-00249, Washington Safety Management Solutions, Aiken, South Carolina, July 2006.

[9] *Limiting Oxygen Concentration in Mixtures of Hydrogen, Air and Argon*, Revision 1, Report No. CRC-2697, Kidde Fenwal Combustion Research Center, October 25, 2006.